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DELINEATION OF SOIL TEMPERATURE  
REGIMES FROM HCMM DATA

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A. Objectives of Contract

An investigation is proposed in which remotely sensed data from the HCMM and Landsat satellites will be evaluated as input into the National Cooperative Soil Survey. The objectives of the project are to:

- 1) determine the feasibility of using HCMM and ancillary data to measure soil surface and plant canopy temperatures and to thereby delineate and map soils into their respective soil temperature regimes; and
- 2) develop and evaluate techniques for using HCMM and HCMM-Landsat merged data for input to the National Cooperative Soil Survey.

B. Activities During Reporting Period

- 1) Unsupervised (CLUS) and supervised (CLASS) classification techniques continue on 13 May 76 Landsat data. Surface heterogeneity in some areas makes signature classification difficult but many homogeneous units have been produced.
- 2) Overlay of Landsat with HCMM data revealed registration problems in that HCMM data subsets covering the Landsat study area showed few good control points. WARP program has been developed to improve registration accuracy of two or more data sets. WARP graphically displays on the Houston Instruments and Versatec plotters the spatial distortion occurring during the "rubber sheet stretch" process. Areas where control points are inaccurate or too few should be detectable.
- 3) Digital terrain elevation data (1:250,000 scale) will also be merged with both the Landsat and HCMM data. Tapes have been obtained from the U.S.G.S. National Cartographic Information Center and initial images have been produced for control point selection.
- 4) Evaluation continues on statistical procedures to quantitatively evaluate the difference between classification of Landsat data alone and Landsat merged with HCMM data. Procedures and software to describe and display the spatial distribution of surface temperature and correlation with soil surface conditions are being evaluated.

C. Planned Activity

- 1) Complete merging process of HCMM, Landsat and digital terrain data sets and evaluate the effectiveness of WARP as an aid to accurate registration.
- 2) Complete category identification and training area selection of 13 May 76 Landsat data. Statistically evaluate the use of HCMM data in the classification procedure when merged with Landsat data.

- 3) Interpret spatial temperature distributions as related to soil characteristics. Incorporate digital terrain elevation data to stratify temperature data into elevation intervals and interpret temperature distributions within the intervals.
- 4) Evaluate the use of HCMM data to group soils into similar temperature regimes utilizing both DAY-IR and NIGHT-IR data over several dates.
- 5) Field survey to evaluate classification results and interpretation of image products.

D. Potential Problem Areas

- 1) Accurate registration of possibly seven data sets to a common base map (1:24,000 orthophotos) may be quite time consuming in that control point selection and subsequent accuracy evaluation using WARP is an iterative process.

E. Costs Accrued to Date

Katherine Marinakos (Secretary), Nanna Bolling (Image Analyst) and George Baumer (Systems Analyst) are presently funded on this project. Rick Day (Graduate Assistant) has been supported by departmental teaching funds.